

**PIB Chemistry / Conversions**

You may know your height in feet and inches, but do you know it in furlongs? How about in fathoms? The table below lists a number of standards for length that may not look familiar to you. Each was originally created for some particular purpose and may or may not be useful today. For example, the angstrom measures atoms and molecules. On the opposite end of the scale, the astronomical unit measures the distance between stars. These days, the term furlong is rarely heard outside a race track. A fathom is a measure of water depth. The light year is not a measure of time, but rather a measure equal to the distance light travels in one year in a vacuum. A parsec is often heard on Star Trek, but it is a real value for measuring interstellar (between stars) space.

Unit	SI Equivalent
1 angstrom	$1.0000 \times 10^{-10}$ m
1 astronomical unit	$1.4960 \times 10^{11}$ m
1 fathom	1.8288 m
1 furlong	201.17 m
1 league	4838 m
1 light year	$9.4606 \times 10^{15}$ m
1 parsec	$3.0857 \times 10^{16}$ m

As you should know, one reason the metric system is so widely used is that it provides a way to easily convert from one unit to another by simply multiplying or dividing by tens. However, a problem arises in the United States where the metric system hasn't been totally adopted by everyone. Driving through the U.S. and into Canada could prove costly if you fail to recognize that the speed limit signs in Canada are in kilometers per hour, not miles per hour. A sign reading 45 km/hr is only about 28 miles per hour. Most cars now have both km/hr and mph on the speedometer so that problem is easy to handle.

For this exercise, you will convert between metric units (this is easy, just multiply or divide by 10), between English units (a little more challenging perhaps), and between metric units and English units (a little more challenging still). Please write all your answers on the following page, show all work on a separate sheet of paper, and don't forget to include units in your answers. Also, please do not include any fractions in your answers. Use decimals.

Some conversion factors to help you.

$$1 \text{ cm}^3 = 1 \text{ mL}$$

$$K = ^\circ C + 273$$

$$16 \text{ tablespoons} = 1 \text{ cup}$$

$$5280 \text{ feet} = 1 \text{ mile}$$

$$1 \text{ inch} = 2.54 \text{ cm}$$

$$1 \text{ kilogram} = 2.20 \text{ lb}$$

$$1 \text{ foot} = 12 \text{ inches}$$

$$3 \text{ teaspoons} = 1 \text{ tablespoon}$$

$$32 \text{ ounces} = 1 \text{ quart}$$

$$1.057 \text{ quarts} = 1 \text{ liter}$$

$$^\circ F = 9/5 \text{ } ^\circ C + 32$$

$$16 \text{ ounces} = 1 \text{ lb}$$

1. 612 g = \_\_\_\_\_ kg
2. 8.160 m = \_\_\_\_\_ mm
3. 3779 mg = \_\_\_\_\_ g
4. 781 mL = \_\_\_\_\_ L
5. 4.18 kg = \_\_\_\_\_ mg
6. 27.8 cm<sup>3</sup> = \_\_\_\_\_ mL
7. 17.38 km = \_\_\_\_\_ cm
8. 3 leagues = \_\_\_\_\_ km
9. 14 fathoms = \_\_\_\_\_ dm
10. 803 parsecs = \_\_\_\_\_ cm
11. 4 tablespoons = \_\_\_\_\_ cups
12. 28 teaspoons = \_\_\_\_\_ cups
13. 43 miles = \_\_\_\_\_ inches
14. 357 ounces = \_\_\_\_\_ lbs
15. 9 lbs = \_\_\_\_\_ ounces
16. 25 hours = \_\_\_\_\_ seconds
17. 2 weeks = \_\_\_\_\_ minutes

18. The mass of a competition type Frisbee is 125 g. What is the mass in ounces?
19. Calculate the length of a football field (100.0 yd) in meters.
20. How many milliliters of a soft drink are contained in a 12.0 oz can?
21. The diameter of a red blood cell is about  $3.0 \times 10^{-4}$  inches. What is its diameter in millimeters?
22. In a recent Belgian Grand Prix, the leader turned a lap with an average speed of 182.83 km/hr. What was his speed in feet per second?
23. If the western Antarctic ice sheet and the Arctic Sea ice melted due to a climatic change, the level of the oceans could rise about 6 m. How much would sea level rise in feet?
24. In 1980, a quantity of 490,000,000 lb of rayon was manufactured in the U.S. for use in carpets, automobiles, tires, and fabrics. What is this mass in kilograms?
25. The height of Mt. Kilimanjaro, the highest mountain in Africa, is 19,565 ft. What is this in kilometers?
26. The distance between two oxygen nuclei in an oxygen molecule is 1.21 angstroms. What is this distance in inches?
27. Normal body temperature is about 98.6°F. What is normal body temperature in °Celsius and Kelvin?
28. During the '96 Olympics, an estimated 90,000 pounds of pasta was consumed by the athletes in the village. How much is this in grams?
29. In boxing, bantamweight is 119 pounds. How many kilograms is this?
30. In the Olympic marathon, Josia Thugwane of South Africa finished first in 2 hours, 12 minutes, and 36 seconds. Keith Brantly, who finished 28<sup>th</sup>, was the first U.S. runner to cross the finish. His time was 2 hours, 18 minutes, and 17 seconds. How many seconds separated these two runners?